OIPE JC98 MAR 07 2005 PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Before the Board of Patent Appeals and Interferences

In re Patent Application of — Atty Dkt. 1585-257 (C# M#)

HORN et al. — TC/A.U.: 2121

Serial No. 09/748,144 — Examiner: R. Hartman, Jr.

Filed: December 27, 2000 — Date: March 7, 2005

Title: METHOD AND APPARATUS FOR AUTOMATED CRACK BEHAVIOR PREDICTION DETERMINATION

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

☐ **Correspondence Address Indication Form Attached.**

☐ **NOTICE OF APPEAL**
Applicant hereby **appeals** to the Board of Patent Appeals and Interferences from the last decision of the Examiner twice/finally rejecting applicant's claim(s). $500.00 (1401)/$250.00 (2401) $

☒ An appeal **BRIEF** is attached in the pending appeal of the above-identified application $500.00 (1402)/$250.00 (2402) $ 500.00

☐ Credit for fees paid in prior appeal without decision on merits -$ ()

☐ A reply brief is attached in triplicate under Rule 41.41 **(no fee)**

☐ Petition is hereby made to extend the current due date so as to cover the filing date of this paper and attachment(s)
One Month Extension $120.00 (1251)/$60.00 (2251)
Two Month Extensions $450.00 (1252)/$225.00 (2252)
Three Month Extensions $1020.00 (1253/$510.00 (2253)
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☐ "Small entity" statement attached.

Less month extension previously paid on -$()

TOTAL FEE ENCLOSED $ 500.00

Any future submission requiring an extension of time is hereby stated to include a petition for such time extension. The Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, in the fee(s) filed, or asserted to be filed, or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our **Account No. 14-1140.** A duplicate copy of this sheet is attached.

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Signature: Alan M. Kagen

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APPEAL BRIEF

Sir:

Applicant hereby **appeals** to the Board of Patent Appeals and Interferences from the last decision of the Examiner.

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(I) REAL PARTY IN INTEREST

The real party in interest is General Electric Company.

(II) RELATED APPEALS AND INTERFERENCES

Appellants, the undersigned, and the assignee are not aware of any related appeals, interferences, or judicial proceedings (past or present), which will directly affect or be directly affected by or have a bearing on the Board's decision in this Appeal.

(III) STATUS OF CLAIMS

Claims 1, 2 and 4-6 are present in this application and have been rejected. No claims have been substantively allowed. Thus, the rejections of claims 1, 2 and 4-6 are appealed herein. A list of the claims on appeal is provided in the Appendix.

(IV) STATUS OF AMENDMENTS

No amendments have been filed subsequent to the Final Rejection dated September 16, 2004.

(V) SUMMARY OF CLAIMED SUBJECT MATTER

The invention relates to predicting crack behavior in boiling water nuclear reactors and, more particularly, to a method and system for evaluating the past and future behavior of cracks or postulated crack indications in specific or postulated nuclear reactor components interactively without human intervention. Figure 1 is a schematic illustration of the system architecture. The user employs a suitable Internet access computer or like access portal 12 to connect with a system server 14 running a server program Internet site. The Internet site includes links to pages enabling input of water chemistry characteristics such as the example shown in Figure 2. See the specification at page 7, lines 12-22.

When all inputs are complete, the server system accesses a crack growth behavior model 16 that predicts component crack behavior according to the water chemistry characteristics input via the page. The crack growth behavior model 16 encompasses the model 18 itself, which accesses specialized parameter databases 20 with links to a materials model, previous history performance databases 22 with links to the materials model, and supporting models for specialized parameter calculations 24 with links to the materials model. Page 7, lines 23-30.

Figures 3 and 4 illustrate example screen shots of history performance databases accessed by the crack growth behavior model 18 for determining the crack growth prediction profile. A historical plot of conductivity readings in the water chemistry over time is shown. Using historical and current data, the crack growth prediction profile can represent a real time crack growth prediction according to the input water chemistry

characteristics. The specification describes that this is a "real time" evaluation in the sense that it uses the current plant data in the context of historical data to project future behavior, which process can be updated at any time to include new plant data. The output is preferably in the form of a graphical representation of a crack growth rate such as a chart or graph, although any suitable output of the crack growth prediction profile or a derived result could be used. See page 7, line 30 - page 8, line 12.

With this system, a user can calculate the predicted behavior of a component or component location over any relevant time frame without human intervention by simply specifying key input parameters. The system provides users the ability to maintain records of previous evaluations for future reference to determine reactor trends and the like. The system also allows the user to improve the quality of the analysis since the system uses input from databases or applicable complementary models for inputs without human intervention. See page 8, lines 13-25.

(VI) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 1, 2, 5 and 6 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,817,958 to Uchida et al.

2. Claim 4 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Uchida.

(VII) ARGUMENT

1. Claims 1, 2, 5 and 6 are not unpatentable under 35 U.S.C. §102(b) over Uchida.

Independent claim 1 defines, *inter alia*, a step of outputting a real time crack growth prediction according to the input water chemistry characteristics. The Office Action seems to recognize that the Uchida patent lacks a specific disclosure of any such real time output; rather, the Office Action contends that "'real time' is interpreted to involve a delay and thus Uchida anticipates this feature since a delay must be present in any controlled system." The present invention, however, embodies an ability to calculate rates that are directly related to real time crack growth behavior. The disclosed system allows a direct ability to process inputs and use them to calculate crack growth rates that will support immediate decisions at the plant. The models are used with the network to address immediate decisions that are critical to plant operation including, for example, environmental changes as well as plant decisions to shut down for inspection or to improve plant operation and thereby avoid damage. The data can also be used in the regulatory environment to support the prudency of these decisions.

The Uchida patent, in contrast, employs plant charts or "plant record information," which imply long term compilation of data for future correlations. The methods are directed at developing residual life that employs such "plant charts" and degradation calculated from the charts. These imply correlation and reliance on experience instead of on real time instantaneous changes using sophisticated models for the component/plant conditions of interest. The latter process embodied in the present invention relates to the capability to assess rapid changes in cracking characteristics.

The models used in the Uchida patent are correlative models. They do not discuss instantaneous modeling; rather they discuss the review of data on the context of "in-family or out of family" types of behavior. The approach in Uchida is directed at estimating the potential for long term degradation since it references incubation times as well as long term degradation. The Uchida patent discusses crack length, which also implies a comparison over a long time as opposed to a crack rate which is instantaneous and is applicable to assessing the behavior of known cracks at any given time of operation. The instantaneous assessment is important to decisions on real time plant operation, which is an important feature of the invention. Nowhere does Uchida remotely consider the possibility or the need for real time crack growth rate calculations. Additionally, Uchida does not refer to the detail of the needed parameters that are used in real time calculations. (Appellants note that cracks were not allowed in Japan in this time frame, and therefore, Uchida's long term assessment approach is consistent with the approaches used during that era.)

In an Advisory Action dated December 9, 2004, the Examiner contends that "the applicant asserted that Uchida does not teach instantaneous modeling (page 3), however this feature is not claimed." This statement, however evidences a fundamental misunderstanding of the claimed subject matter. The method defined in claim 1 embodies predicting component crack behavior in a nuclear reactor. In one step, a crack growth behavior model is accessed which predicts component crack behavior according to the input water chemistry characteristics. A crack growth prediction profile is output according to an analysis of the crack growth behavior model by outputting a real time

crack growth prediction according to the input water chemistry characteristics. It is clear from the description, as would also be understood by those of ordinary skill in the art, that the use of "real time" crack growth prediction is in fact the "instantaneous modeling" referenced in the Amendment filed November 24, 2004. Additionally, the Advisory Action references the Applicants' characterization of the Uchida patent with reference to component crack considerations in Japan during the time of the Uchida patent. The Advisory Action suggests that the Uchida disclosure "is not limited by past practice." This point, however, merely exemplifies and justifies the Appellants' analysis of the teachings in the Uchida patent. Appellants do not contend that the Uchida patent is limited by past practice. Rather, Uchida utilizes a long term assessment analysis, which is distinguishable from the real time crack growth prediction defined according to the present invention.

Moreover, the Advisory Action references Uchida at column 6, lines 21-40 and Figure 14. This section in Uchida, however, references plant status variables 8 that are exchanged and updated to new data every moment. Past data are accumulated in a storage means. The past plant status variables are put together into a plant chart. Uchida mentions models for predicting various conditions of the plant, but nowhere does this section in Uchida even remotely suggest that such predictions are performed in real time. Additionally, Uchida lacks any reference to crack growth behavior in the referenced section.

Appellants thus submit that Uchida lacks any teaching of outputting a real time crack growth prediction according to the input water chemistry characteristics as claimed. As a consequence, Appellants respectfully submit that the rejection is misplaced.

With regard to dependent claim 2, Appellants submit that this claim is allowable at least by virtue of its dependency on an allowable independent claim.

Appellants submit that claims 5 and 6 are allowable for reasons similar to those discussed above with respect to claim 1. Additionally, claim 6 defines a step of accessing a crack growth behavior model that predicts component crack behavior according to the input water chemistry characteristics, wherein the input water chemistry characteristics are the only data input via the global computer network for predicting component crack behavior. This subject matter is not addressed in the final Office Action or the Advisory Action. Appellants respectfully submit that Uchida lacks any teaching of predicting component crack behavior utilizing only input water chemistry characteristics input via a global network.

Reversal of this rejection is thus respectfully requested.

2. Claim 4 is not unpatentable under 35 U.S.C. §103(a) over Uchida.

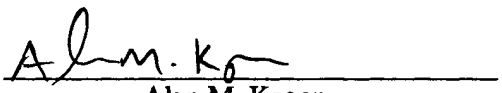
The Uchida patent does not provide any suggestion to modify its disclosure to encompass at least the subject matter wherein a real time crack growth prediction is output according to input water chemistry characteristics as discussed above. Appellants thus respectfully submit that this rejection is misplaced and that claim 4 is allowable for reasons similar to those discussed above with respect to claim 1. Reversal of the rejection is thus respectfully requested.

CONCLUSION

In conclusion, it is believed that the application is in clear condition for allowance; therefore, early reversal of the Final Rejection and passage of the subject application to issue are earnestly solicited.

Respectfully submitted,

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(VIII) CLAIMS APPENDIX

1. A method of predicting component crack behavior in a nuclear reactor, the method comprising:

(a) receiving input water chemistry characteristics over a global computer network;

(b) accessing a crack growth behavior model that predicts component crack behavior according to the input water chemistry characteristics; and

(c) outputting over the global computer network a crack growth prediction profile according to an analysis of the crack growth behavior model by outputting a real time crack growth prediction according to the input water chemistry characteristics.

2. A method according to claim 1, wherein step (c) is practiced by generating a graphical representation of a crack growth rate according to the input water chemistry characteristics.

4. A computer system for predicting component crack behavior in a nuclear reactor, the computer system comprising:

at least one user computer running a computer program that receives input water chemistry characteristics; and

a system server running a server program, the at least one user computer and the system server being interconnected by a computer network, the system server storing a crack growth behavior model that predicts component crack behavior according to the input water chemistry characteristics, and the system server outputting over the computer network a crack growth prediction profile according to an analysis of the crack growth

behavior model by outputting a real time crack growth prediction according to the input water chemistry characteristics.

5. A computer program embodied on a computer readable medium for predicting component crack behavior in a boiling water nuclear reactor, the computer program comprising:

means for receiving input water chemistry characteristics over a global computer network;

means for accessing a crack growth behavior model that predicts component crack behavior according to the input water chemistry characteristics; and

means for outputting over the global computer network a crack growth prediction profile or crack growth based result according to an analysis of the crack growth behavior model by outputting a real time crack growth prediction according to the input water chemistry characteristics.

6. A method of predicting component crack behavior in a nuclear reactor, the method comprising:

(a) receiving input water chemistry characteristics over a global computer network;

(b) accessing a crack growth behavior model that predicts component crack behavior according to the input water chemistry characteristics, wherein the input water chemistry characteristics are the only data input via the global computer network for predicting component crack behavior; and

(c) outputting over the global computer network a crack growth prediction profile according to an analysis of the crack growth behavior model by outputting a real time crack growth prediction according to the input water chemistry characteristics.